

## High-Performance Contaminant Monitor for Spacecraft, Phase II

Completed Technology Project (2005 - 2007)



## Project Introduction

The Vision for Space Exploration demands increasing reliance on real-time trace gas monitors onboard spacecraft. Present grab samples and badges will be inadequate beyond low-Earth-orbit. New better monitors will be critical components for early detection of fire, release event monitoring, crew habitability, and air revitalization processes. The danger from fire and toxic releases aboard spacecraft is constant with only moments for detection and contravention. Spacecraft are unique high-value systems where failure is measured in lives, dollars, time, and public perception. Space crews have little chance of escaping vessels that cannot continue to support life. It is imperative to detect danger in these closed-cycle environments at the earliest possible moment. Present fire detectors onboard spacecraft are inadequate due to fatigue, sensitivity or time response. Smoke detectors are insufficient for detecting the earliest stages of combustion. Further, smoke detectors will become increasingly unreliable due to false alarms upon exposure to dust particulates from the Moon and Mars. Sensors are needed to directly detect the molecular products of combustion. Vista Photonics proposes to develop rugged, compact prototype optical fire detection and contaminant monitoring instrumentation capable of selectively measuring a critical suite of contaminants at parts-per-million (ppm) or better sensitivities in a few seconds.

## Anticipated Benefits

Potential NASA Commercial Applications: Phase III commercial applications abound for sensors whose performance and physical characteristics are suitable for spaceflight. Vista Photonics will focus initial commercialization efforts on two of these, moisture contamination in semiconductor process gases and acetylene contamination of chemical manufacturing feedstock gases. Both contaminants were detected at relevant low-ppb levels during the Phase I project. The fully-developed Phase II instruments shall offer a compelling and desirable blend of performance, affordability, compactness, simplicity and ease-of-use relative to present commercial product offerings in both industries. Other applications include environmental monitoring, occupational safety, biomedical breath diagnostics and homeland security monitoring of high-value buildings, rail, and mass-transit.



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Glenn Research Center (GRC)

### Responsible Program:

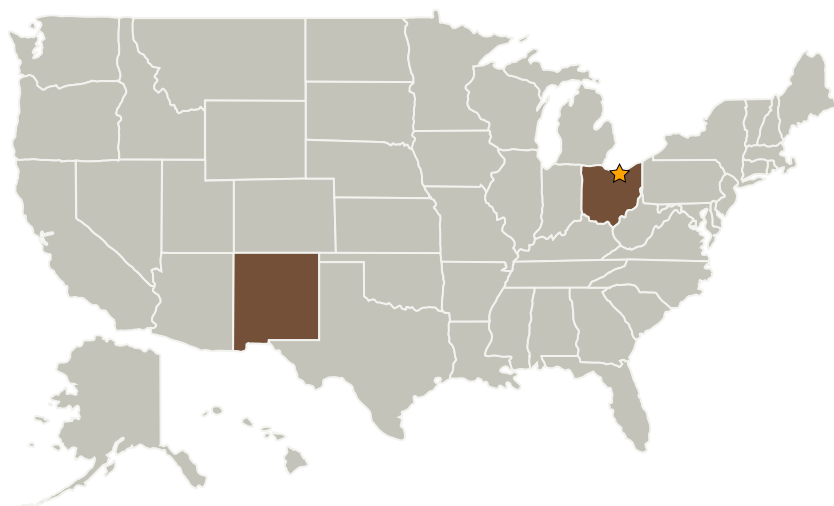
Small Business Innovation Research/Small Business Tech Transfer

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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Vista Photonics, Inc.	Supporting Organization	Industry	Santa Fe, New Mexico

## Primary U.S. Work Locations

New Mexico	Ohio
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## Project Transitions

**November 2005:** Project Start**December 2007:** Closed out**Closeout Summary:** High-Performance Contaminant Monitor for Spacecraft, Phase II Project Image

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Jeffrey S Pilgrim

## Technology Areas

**Primary:**

- TX06 Human Health, Life Support, and Habitation Systems
  - └ TX06.4 Environmental Monitoring, Safety, and Emergency Response
    - └ TX06.4.2 Fire: Detection, Suppression, and Recovery